

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number  
**WO 03/089560 A2**(51) International Patent Classification<sup>2</sup>: **C11D 17/00**,  
3/20, 3/10, 3/12, 1/22, 1/14, 3/00, 3/395

(21) International Application Number: PCT/US03/11211

(22) International Filing Date: 10 April 2003 (10.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
10/123,734 16 April 2002 (16.04.2002) US  
10/125,735 18 April 2002 (18.04.2002) US(71) Applicant: COLGATE-PALMOLIVE COMPANY  
(US/US); 300 Park Avenue, New York, NY 10022 (US).

(72) Inventors: GORLIN, Philip; 4 Blossom Lane, Flemington, NJ 08822 (US). ZABARYLO, Steven; #10-455 Apache Court, Mississauga, Ontario L4Z 3W8 (CA). ASZMAN, Harry; 43 Baird Road, Englishtown, NJ 07726 (US). FLETCHER, John; 246 Spring Garden Road, Oakville, Ontario L6L-5H4 (CA).

(74) Agent: NANFELDT, Richard, E.; Colgate-Palmolive Company, 909 River Road, P.O. Box 1343, Piscataway, NJ 08855-1343 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,

CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GI, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

## Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

## Published:

- without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



WO 03/089560 A2

(54) Title: CLEANING COMPOSITIONS IN THE FORM OF A TABLET

(57) Abstract: A water soluble tablet comprising a cleaning composition which contains an effervescent system.

WO 03/089560

PCT/US03/11211

1

## CLEANING COMPOSITIONS IN THE FORM OF A TABLET

Field of the Invention

This invention relates to a concentrate of a cleaning composition containing a  
5 bleach compound in the form of a tablet which has excellent foam collapse properties  
and excellent antibacterial properties grease cutting properties designed in particular  
for cleaning hard surfaces and which is effective in removing grease soil and/or bath  
soil and in leaving unrinsed surfaces with a shiny appearance.

Background of the Invention

10 In recent years all-purpose liquid detergents have become widely accepted for  
cleaning hard surfaces, e.g., painted woodwork and panels, tiled walls, wash bowls,  
bathtubs, linoleum or tile floors, washable wall paper, etc. Such all-purpose liquids  
comprise clear and opaque aqueous mixtures of water-soluble synthetic organic  
detergents and water-soluble detergent builder salts. In order to achieve comparable  
15 cleaning efficiency with granular or powdered all-purpose cleaning compositions, use of  
water-soluble inorganic phosphate builder salts was favored in the prior art all-purpose  
liquids. For example, such early phosphate-containing compositions are described in  
U.S. Patent Nos. 2,560,839; 3,234,138; 3,350,319; and British Patent No. 1,223,739.

In view of the environmentalist's efforts to reduce phosphate levels in ground  
20 water, improved all-purpose liquids containing reduced concentrations of inorganic  
phosphate builder salts or non-phosphate builder salts have appeared. A particularly  
useful self-opacified liquid of the latter type is described in U.S. Patent No. 4,244,840.

However, these prior art all-purpose liquid detergents containing detergent  
builder salts or other equivalent tend to leave films, spots or streaks on cleaned  
25 unrinsed surfaces, particularly shiny surfaces. Thus, such liquids require thorough  
rinsing of the cleaned surfaces which is a time-consuming chore for the user.

In order to overcome the foregoing disadvantage of the prior art all-purpose  
liquid, U.S. Patent No. 4,017,409 teaches that a mixture of paraffin sulfonate and a  
reduced concentration of inorganic phosphate builder salt should be employed.

WO 03/089560

PCT/US03/11211

2

However, such compositions are not completely acceptable from an environmental point of view based upon the phosphate content. On the other hand, another alternative to achieving phosphate-free all-purpose liquids has been to use a major proportion of a mixture of anionic and nonionic detergents with minor amounts of glycol ether solvent and organic amine as shown in U.S. Patent No. 3,935,130. Again, this approach has not been completely satisfactory and the high levels of organic detergents necessary to achieve cleaning cause foaming which, in turn, leads to the need for thorough rinsing which has been found to be undesirable to today's consumers.

Another approach to formulating hard surfaced or all-purpose liquid detergent composition where product homogeneity and clarity are important considerations involves the formation of oil-in-water (o/w) microemulsions which contain one or more surface-active detergent compounds, a water-immiscible solvent (typically a hydrocarbon solvent), water and a "cosurfactant" compound which provides product stability. By definition, an o/w microemulsion is a spontaneously forming colloidal dispersion of "oil" phase particles having a particle size in the range of 25 to 800 Å in a continuous aqueous phase.

In view of the extremely fine particle size of the dispersed oil phase particles, microemulsions are transparent to light and are clear and usually highly stable against phase separation.

Patent disclosures relating to use of grease-removal solvents in o/w microemulsions include, for example, European Patent Applications EP 0137615 and EP 0137616 - Herbots et al; European Patent Application EP 0160762 - Johnston et al; and U.S. Patent No. 4,561,991 - Herbots et al. Each of these patent disclosures also teaches using at least 5% by weight of grease-removal solvent.

It also is known from British Patent Application GB 2144763A to Herbots et al, published March 13, 1985, that magnesium salts enhance grease-removal performance of organic grease-removal solvents, such as the terpenes, in o/w microemulsion liquid detergent compositions. The compositions of this invention

WO 03/089560

PCT/US03/11211

3

described by Herbots et al. require at least 5% of the mixture of grease-removal solvent and magnesium salt and preferably at least 5% of solvent (which may be a mixture of water-immiscible non-polar solvent with a sparingly soluble slightly polar solvent) and at least 0.1% magnesium salt.

- 5           However, since the amount of water immiscible and sparingly soluble components which can be present in an o/w microemulsion, with low total active ingredients without impairing the stability of the microemulsion is rather limited (for example, up to 18% by weight of the aqueous phase), the presence of such high quantities of grease-removal solvent tend to reduce the total amount of greasy or oily  
10       soils which can be taken up by and into the microemulsion without causing phase separation.

- The following representative prior art patents also relate to liquid detergent cleaning compositions in the form of o/w microemulsions: U.S. Patents No. 4,472,291 - Rosario; U.S. Patent No. 4,540,448 - Gauteer et al; U.S. Patent No. 3,723,330 -  
15       Shefflin; etc.

- Liquid detergent compositions which include terpenes, such as d-limonene, or other grease-removal solvent, although not disclosed to be in the form of o/w microemulsions, are the subject matter of the following representative patent documents: European Patent Application 0080749; British Patent Specification  
20       1,603,047; and U.S. Patent Nos. 4,414,128 and 4,540,505. For example, U.S. Patent No. 4,414,128 broadly discloses an aqueous liquid detergent composition characterized by, by weight:

- (a)     from 1% to 20% of a synthetic anionic, nonionic, amphoteric or zwitterionic surfactant or mixture thereof;
- 25       (b)     from 0.5% to 10% of a mono- or sesquiterpene or mixture thereof, at a weight ratio of (a):(b) being in the range of 5:1 to 1:3; and
- (c)     from 0.5% 10% of a polar solvent having a solubility in water at 15°C in the range of from 0.2% to 10%. Other ingredients present in the formulations disclosed in this patent include from 0.05% to 2% by weight of an alkali metal, ammonium or

WO 03/089560

PCT/US03/11211

4

alkanolammonium soap of a C<sub>13</sub>-C<sub>24</sub> fatty acid; a calcium sequestrant from 0.5% to 13% by weight; nonaqueous solvent, e.g., alcohols and glycol ethers, up to 10% by weight; and hydrotropes, e.g., urea, ethanolamines, salts of lower alkylaryl sulfonates, up to 10% by weight. All of the formulations shown in the Examples of this patent include relatively large amounts of detergent builder salts which are detrimental to surface shine.

#### Summary of the Invention

The present invention provides a cleaning system comprising a concentrate of a cleaning composition in a tablet form which has excellent foam collapse properties, good antibacterial properties and excellent grease cutting property which, when dissolved in a bucket, is suitable for cleaning hard surfaces such as plastic, vitreous and metal surfaces having a shiny finish, oil stained floors, automotive engines and other engines. More particularly, the improved cleaning compositions, with excellent foam collapse properties and excellent grease cutting property exhibit good grease soil removal properties due to the improved interfacial tensions, when used diluted and leave the cleaned surfaces shiny without the need of or requiring only minimal additional rinsing or wiping. The latter characteristic is evidenced by little or no visible residues on the unrinsed cleaned surfaces and, accordingly, overcomes one of the disadvantages of prior art products.

Surprisingly, these desirable results are accomplished even in the absence of polyphosphate or other inorganic or organic detergent builder salts and also in the complete absence or substantially complete absence of grease-removal solvent.

This invention relates to all purpose cleaning detergents in tablet form which quickly dissolve to give a cleaning solution suitable for a variety of household light duty cleaning chores such as in the kitchen or bathroom, etc. The tablet contains a bleach compound and an effervescent system consisting of an organic acid and sodium bicarbonate to give an efficacy signal while dissolving. In addition, the tablet can also optionally contain a bleach and two polymeric disintegrants which help disintegrate the tablet when added to water. The tablets can be made either as a single layer tablet

WO 03/089560

PCT/US03/11211

5

with colored speckles for aesthetic benefits or can be a multi-layer tablet with different colored layers.

In one aspect, the invention generally provides a single or multi layer tablet which comprises by weight:

5 (a) 40% to 60% of an alpha hydroxy aliphatic acid such as lactic acid or citric acid;

(b) 20% to 30% of an alkali metal bicarbonate such as sodium bicarbonate or potassium bicarbonate;

(c) 2% to 8% of a magnesium containing inorganic salt selected from the  
10 group consisting of magnesium sulfate, magnesium oxide and magnesium chloride and mixtures thereof.

(d) 1% to 9% of a clay;

(e) 1% to 10% of a sulfonated anionic surfactant;

(f) 0.1% to 4% of an alkali metal salt of a polycarboxylic acid;

15 (g) 0.1% to 4% of a solubilizing agent;

(h) 0.5% to 1% of an alkali metal or an alkaline earth metal salt of a fatty acid such as magnesium stearate;

(i) 0 to 5%, more preferably 0.1% to 3% of an ethoxylated nonionic surfactant;

20 (j) 0 to 5%, more preferably 0.1% to 4% of a green colored citric acid in the form of speckles such as green speckles;

(k) 0 to 5%, more preferably 0.1% to 4% of a blue colored citric acid in the form of speckles such as blue speckles;

(l) 0 to 20%, more preferably 1% to 20% of a bleach compound; and

25 (m) 0 to 2.5%, more preferably 0.1% to 2% of a perfume.

In another aspect, the invention generally provides a single or multi layer tablet which comprises by weight:

(a) 20% to 50% of an alpha hydroxy aliphatic acid such as lactic acid or citric acid;

WO 03/089560

PCT/US03/11211

6

(b) 25% to 45% of an alkali metal bicarbonate such as sodium bicarbonate or potassium bicarbonate;

(c) 1% to 15% of an alkali metal carbonate such as potassium and/or sodium carbonate and mixtures thereof.

5 (d) 1% to 9% of a clay;

(e) 1% to 10% of a sulfonated anionic surfactant;

(f) 2% to 12% of a C<sub>4</sub>-C<sub>12</sub> aliphatic dicarboxylic acid such as adipic acid;

(g) 0.1% to 6%, more preferably 0.25% to 4% of an amorphous precipitated silica;

10 (h) 0 to 5% of a blue or green colorant;

(i) 0 to 6%, more preferably 0.1% to 4% of a sodium sulfate; and

(j) 0 to 20%, more preferably 1% to 20% of a bleach compound; and

(k) 0 to 2.5%, more preferably 0.1% to 2% of a perfume.

#### Detailed Description of the Invention

15 The present invention relates to a tablet containing a unit dose of a cleaning composition.

One liquid cleaning composition contained in the form of a single or multi-layered tablet comprises by weight:

20 (a) 40% to 60% of an alpha hydroxy aliphatic acid such as lactic acid or citric acid;

(b) 20% to 30% of an alkali metal bicarbonate such as sodium bicarbonate or potassium bicarbonate;

(c) 2% to 8% of a magnesium containing inorganic salt selected from the group consisting of magnesium sulfate, magnesium oxide and magnesium chloride and  
25 mixtures thereof.

(d) 1% to 9% of a clay;

(e) 1% to 10% of a sulfonated anionic surfactant;

(f) 0.1% to 4% of an alkali metal salt of a polycarboxylic acid;

(g) 0.1% to 4% of a solubilizing agent;

WO 03/089560

PCT/US03/11211

7

(h) 0.5% to 1% of an alkali metal or an alkaline earth metal salt of a fatty acid such as magnesium stearate;

(i) 0 to 5%, more preferably 0.1% to 3% of an ethoxylated nonionic surfactant;

5 (j) 0 to 5%, more preferably 0.1% to 4% of a green colored citric acid in the form of speckles;

(k) 0 to 5%, more preferably 0.1% to 4% of a blue colored citric acid in the form of speckles;

(l) 0 to 20%, more preferably 1% to 20% of a bleach compound; and

10 (m) 0 to 5.0%, more preferably 0.1% to 4% of a perfume.

Another liquid cleaning composition contained in the form of a single or multi-layered tablet comprises by weight:

(a) 20% to 50% of an alpha hydroxy aliphatic acid such as lactic acid or citric acid;

15 (b) 25% to 45% of an alkali metal bicarbonate such as sodium bicarbonate or potassium bicarbonate;

(c) 1% to 15% of an alkali metal carbonate such as potassium and/or sodium carbonate;

(d) 1% to 9% of a clay;

20 (e) 1% to 10% of a sulfonated anionic surfactant;

(f) 2% to 12% of a C<sub>4</sub>-C<sub>12</sub> aliphatic dicarboxylic acid such as adipic acid;

(g) 0.1% to 6%, more preferably 0.25% to 4% of an amorphous precipitated silica;

(h) 0 to 0.5% of a blue or green colorant;

25 (i) 0 to 6%, more preferably 0.1% to 4% of a sodium sulfate;

(j) 0 to 20%, more preferably 1% to 20% of a bleach compound; and

(k) 0 to 5.0%, more preferably 0.1% to 4% of a perfume.

As used herein and in the appended claims the term "perfume" is used in its ordinary sense to refer to and include any non-water soluble fragrant substance or



WO 03/089560

PCT/US03/11211

8

mixture of substances including natural (i.e., obtained by extraction of flower, herb, blossom or plant), artificial (i.e., mixture of natural oils or oil constituents) and synthetically produced substance) odoriferous substances. Typically, perfumes are complex mixtures of blends of various organic compounds such as alcohols, aldehydes, ethers, aromatic compounds and varying amounts of essential oils (e.g., terpenes) such as from 0% to 80%, usually from 10% to 70% by weight, the essential oils themselves being volatile odoriferous compounds and also serving to dissolve the other components of the perfume.

In the present invention the precise composition of the perfume is of no particular consequence to cleaning performance so long as it meets the criteria of water immiscibility and having a pleasing odor. Naturally, of course, especially for cleaning compositions intended for use in the home, the perfume, as well as all other ingredients, should be cosmetically acceptable, i.e., non-toxic, hypoallergenic, etc..

The nonionic surfactant which can be used in the instant cleaning composition is selected from the group of an aliphatic ethoxylated nonionic surfactant and an aliphatic ethoxylated/propoxylated nonionic surfactant and mixtures thereof.

The water soluble aliphatic ethoxylated nonionic surfactants utilized in this invention are commercially well known and include the primary aliphatic alcohol ethoxylates and secondary aliphatic alcohol ethoxylates. The length of the polyethenoxy chain can be adjusted to achieve the desired balance between the hydrophobic and hydrophilic elements.

The nonionic surfactant class includes the condensation products of a higher alcohol (e.g., an alkanol containing 8 to 16 carbon atoms in a straight or branched chain configuration) condensed with 4 to 20 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with 16 moles of ethylene oxide (EO), tridecanol condensed with 6 to 15 moles of EO, myristyl alcohol condensed with 10 moles of EO per mole of myristyl alcohol, the condensation product of EO with a cut of coconut fatty alcohol containing a mixture of fatty alcohols with alkyl chains varying from 10 to 14 carbon atoms in length and wherein the condensate contains either 6 moles of EO per

WO 03/089560

PCT/US03/11211

9

mole of total alcohol or 9 moles of EO per mole of alcohol and tallow alcohol ethoxylates containing 6 EO to 11 EO per mole of alcohol.

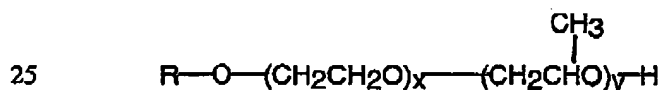
A preferred group of the foregoing nonionic surfactants are the Neodol ethoxylates (Shell Co.), which are higher aliphatic, primary alcohol containing 9-15 carbon atoms, such as C<sub>9</sub>-C<sub>11</sub> alkanol condensed with 4 to 10 moles of ethylene oxide (Neodol 91-8 or Neodol 91-5), C<sub>12</sub>-C<sub>13</sub> alkanol condensed with 6.5 moles ethylene oxide (Neodol 23-6.5), C<sub>12</sub>-C<sub>15</sub> alkanol condensed with 12 moles ethylene oxide (Neodol 25-12), C<sub>14</sub>-C<sub>15</sub> alkanol condensed with 13 moles ethylene oxide (Neodol 45-13), and the like. Such ethoxamers have an HLB (hydrophobic lipophilic balance) value of 8 to 15 and give good O/W emulsification, whereas ethoxamers with HLB values below 7 contain less than 4 ethyleneoxide groups and tend to be poor emulsifiers and poor detergents.

Additional satisfactory water soluble alcohol ethylene oxide condensates are the condensation products of a secondary aliphatic alcohol containing 8 to 18 carbon atoms in a straight or branched chain configuration condensed with 5 to 30 moles of ethylene oxide. Examples of commercially available nonionic detergents of the foregoing type are C<sub>11</sub>-C<sub>15</sub> secondary alkanol condensed with either 9 EO (Tergitol 15-S-9) or 12 EO (Tergitol 15-S-12) marketed by Union Carbide.

One of the water soluble nonionic surfactants which can be utilized in this invention are an aliphatic ethoxylated/propoxylated nonionic surfactants which are depicted by the formula:



or



wherein R is a branched chain alkyl group having 10 to 16 carbon atoms, preferably an isotridecyl group and x and y are independently numbered from 1 to 20.

Suitable water-soluble non-soap, anionic surfactants used in the instant compositions include those surface-active or detergent compounds which contain an

WO 03/089560

PCT/US03/11211

10

organic hydrophobic group containing generally 8 to 26 carbon atoms and preferably 10 to 18 carbon atoms in their molecular structure and at least one water-solubilizing group selected from the group of sulfonate, sulfate and carboxylate so as to form a water-soluble detergent. Usually, the hydrophobic group will include or comprise a C<sub>8</sub>-C<sub>22</sub> alkyl, alkyl or acyl group. Such surfactants are employed in the form of water-soluble salts and the salt-forming cation usually is selected from the group consisting of sodium, potassium, ammonium, magnesium and mono-, di- or tri-C<sub>2</sub>-C<sub>3</sub> alkanolammonium, with the sodium, magnesium and ammonium cations again being preferred.

10 Examples of suitable sulfonated anionic surfactants for use in the instant compositions are the well known higher alkyl mononuclear aromatic sulfonates such as the higher alkyl benzene sulfonates containing from 10 to 16 carbon atoms in the higher alkyl group in a straight or branched chain, C<sub>8</sub>-C<sub>15</sub> alkyl toluene sulfonates and C<sub>8</sub>-C<sub>15</sub> alkyl phenol sulfonates.

15 A preferred sulfonate is linear alkyl benzene sulfonate having a high content of 3- (or higher) phenyl isomers and a correspondingly low content (well below 50%) of 2- (or lower) phenyl isomers, that is, wherein the benzene ring is preferably attached in large part at the 3 or higher (for example, 4, 5, 6 or 7) position of the alkyl group and the content of the isomers in which the benzene ring is attached in the 2 or 1 position is  
20 correspondingly low. Particularly preferred materials are set forth in U.S. Patent 3,320,174.

Other suitable anionic surfactants are the olefin sulfonates, including long-chain alkene sulfonates, long-chain hydroxyalkane sulfonates or mixtures of alkene sulfonates and hydroxyalkane sulfonates. These olefin sulfonate detergents may be  
25 prepared in a known manner by the reaction of sulfur trioxide (SO<sub>3</sub>) with long-chain olefins containing 8 to 25, preferably 12 to 21 carbon atoms and having the formula RCH=CHR<sub>1</sub> where R is a higher alkyl group of 6 to 23 carbons and R<sub>1</sub> is an alkyl group of 1 to 17 carbons or hydrogen to form a mixture of sultones and alkene sulfonic acids which is then treated to convert the sultones to sulfonates. Preferred olefin

WO 03/089560

PCT/US03/11211

11

sulfonates contain from 14 to 16 carbon atoms in the R alkyl group and are obtained by sulfonating an  $\alpha$ -olefin.

Other examples of suitable anionic sulfonate surfactants are the paraffin sulfonates containing 10 to 20, preferably 13 to 17, carbon atoms. Primary paraffin sulfonates are made by reacting long-chain  $\alpha$  olefins and bisulfites and paraffin sulfonates having the sulfonate group distributed along the paraffin chain are shown in U.S. Patents Nos. 2,503,280; 2,507,088; 3,260,744; 3,372,188; and German Patent 735,096.

The clays which used in the instant compositions are the inorganic, colloid-forming clays of smectite and/or attapulgite types. These materials are generally used in amounts of 0.5 wt. % to 10 wt. %, preferably 1 to 9 wt. %.

Smectite clays include montmorillonite (bentonite), hectorite, smectite, saponite, and the like. Montmorillonite clays are available under tradenames such as Thixogel (Registered trademark) No. 1 and Gelwhite (Registered trademark) GP, H, etc., from Georgia Kaolin Company; and ECCAGUM (Registered trademark) GP, H, etc., from Luthern Clay Products. Attapulgite clays include the materials commercially available under the tradename Attagel (Registered trademark), i.e. Attagel 40, Attagel 50 and Attagel 150 from Engelhard Minerals and Chemicals Corporation. Mixtures of smectite and attapulgite types in weight ratios of 4:1 to 1:5 are also useful herein. Another clay is a bentonite clay containing a blue, green or pink dye which is manufactured by Larivosa Chimica Mineraria, S.p.A. and manufactured under the name of Detercoal P4™. A most preferred clay is Iaponite RD clay manufactured by Southern Clay.

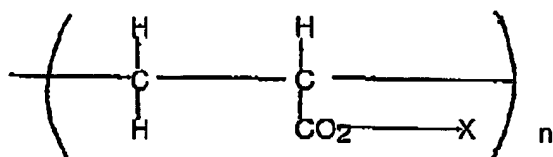
A bleach compound may be optionally employed in the compositions of this invention. Preferred bleach compounds are chlorine bleach compounds such as dichloroisocyanurate, dichloro-dimethyl hydantoin, or chlorinated TSP, alkali metal or alkaline earth metal, e.g. potassium, lithium, magnesium and especially sodium, hypochlorite is preferred.

The alkali metal salt of the polyacrylic acid crosslinked polyacrylic acid polymer which has the structure of:

WO 03/089560

PCT/US03/11211

12



wherein n is a number sufficient to provide a polymer with a molecular weight of  
 5 400,000 to 2,000,000, more preferably 400,000 to 1,500,000 and X is an alkali metal or  
 alkaline earth metal cation. A preferred crosslinked polyacrylic acid polymer is Acusol  
 771<sup>TM</sup> manufactured by the Rohm and Haas Company.

The solubilizing agent enhances the solubility of the tablet in the water during  
 when added to water. The solubilizing agent is a crosslinked N-2-polyvinyl pyrrolidone  
 10 having a particle size of 15 to 125 microns. The polyvinyl pyrrolidone is manufactured  
 by International Speciality Corp. under the tradename Polyplasdone<sup>TM</sup> XL (100  
 microns) or Polyplasdone<sup>TM</sup> XL-10 (30 microns).

The lubricant used in the cleaning tablet is used to improve the process for  
 manufacturing the tablet by improving the release of the tablet from the mold during the  
 15 manufacture. The lubricant is an alkali metal salt of a fatty acid having 8 to 22 carbon  
 atoms such as sodium stearate magnesium stearate or potassium stearate and is used  
 at a concentration of 0.05 to 2 wt. %, more preferably 0.1 to 1.0 wt. %.

The instant tablets can also contain 0 to 5.0 wt. %, more preferably 0.1% to 4%  
 by weight of a fragrance. The instant compositions can optionally contain 0 to 15 wt. %  
 20 of a lipase, protease or amylase enzyme and mixtures thereof.

The cleaning composition of this invention may, if desired, also contain other  
 components either to provide additional effect or to make the product more attractive to  
 the consumer. The following are mentioned by way of example: Colors or dyes in  
 amounts up to 0.5% by weight; bactericides in amounts up to 1% by weight;  
 25 preservatives or antioxidizing agents, such as formalin, 5-bromo-5-nitro-dioxan-1,3; 5-  
 chloro-2-methyl-4-isothiazolin-3-one, 2,6-di-tert.butyl-p-cresol, etc., in amounts up to  
 2% by weight. In final form, the cleaning compositions which contain less than 5 wt. %  
 of water exhibit stability at reduced and increased temperatures.

WO 03/089560

PCT/US03/11211

13

The process for making the tablets contain two steps. Dry blending of formula amounts of powders with an overspray of the liquid nonionic and fragrance. Any needed color solutions are also sprayed at this time and then running the resulting powder through a tablet press which has molds to prepare tablets of desired shape, size and weight. The powders are added to the mixer (twin shell or other appropriate mixer).

The powder is then fed to a rotary press having from 19 to 30 molds. Tablets are pressed at a high speed (5 per second). As they exit the press, they are channeled to the packaging line. The tablets can be generally any shape but preferably elliptical in shape or the tablets can be elongated in shape with curved ends such as an oval shape or even circular, square or rectangular.

The following examples illustrate liquid cleaning compositions of the described invention. Unless otherwise specified, the proportions in the film and elsewhere in the specification are by weight.

#### Example 1

The following formula was prepared in wt. % by simple mixing and then formed into a tablet:

Sodium dichloroisocyanurate dihydrate	10.00
Sodium bicarbonate - granular	32.20
Sodium carbonate - anhydrous	7.00
Sodium dodecyl benzene sulfonate - 85% Al	5.00
Anhydrous citric acid - granular	31.25
Adipic acid	7.50
CI pigment blue 15:1 (CI74160)	0.05
White bentonite clay powder No. 2	5.00
Synthetic amorphous precipitated silica	0.75

The tablet containing the above formulas were dissolved in three minutes in 2 L of water in a vessel. This formula generates foam during dissolution and subsequent use.

WO 03/089560

PCT/US03/11211

14

Example 2

The following formula was prepared in wt. % by simple mixing and then formed into a tablet:

Sodium bicarbonate - granular	24.25
Anhydrous citric acid - granular	48.90
Linear alkyl benzene sulfonate surfactant (85 %)	5.00
C9-11 alcohol EO 7.5-8:1	0.20
Polycarboxylic acid, sodium salt (Acusol 771 Polymer)	2.00
Polyplasdone XL10	2.00
Magnesium sulfate - anhydrous	5.00
Blue Speckles (citric acid)	3.00
Green Speckles (citric acid)	3.00
Magnesium stearate	0.40
Laponite RD clay	5.00

- 5 The tablet containing the above formulas were dissolved in three minutes in 2 L of water in a vessel. This formula generates foam during dissolution and subsequent use. For example, at a typical use concentration of 0.4 % in tap water (23°C), this formula generates 180 mL of foam in an inverted cylinder foam test (flash foam).

10 Example 3

The following formula was prepared in wt. % by simple mixing and then formed into a tablet:

Sodium bicarbonate	36.20
Citric acid	35.50
Adipic acid	7.50
Sodium carbonate	7.00
Bentonite clay	4.55
Sodium dodecyl benzene sulfonate	4.25
Perfume	3.00
Synthetic amorphous silica precipitated	0.75
Sodium sulfate	0.60
CI pigment blue 15 (CI 74160)	0.40
Laponite RD clay	0.05

- 15 The tablet containing the above formulas were dissolved in three minutes 2 L of water in a vessel.

WO 03/089560

PCT/US03/11211

15

What Is Claimed:

1. A cleaning tablet which comprises by weight:
  - (a) 40% to 60% of an alpha hydroxy aliphatic acid;
  - (b) 20% to 30% of an alkali metal bicarbonate;
  - 5 (c) 2% to 8% of a magnesium containing inorganic salt;
  - (d) 1% to 9% of a clay;
  - (e) 1% to 10% of a sulfonated anionic surfactant;
  - (f) 0.1% to 4% of an alkali metal salt of a polycarboxylic acid;
  - (g) 0.1% to 4% of a solubilizing agent; and
  - 10 (h) 0.5% to 1% of an alkali metal or an alkaline earth metal salt of a fatty acid  
such as magnesium stearate;
2. A cleaning tablet according to Claim 1 further including a nonionic surfactant.
3. A cleaning tablet according to Claim 1 further including a perfume.
- 15 4. A cleaning tablet according to Claim 3 further including blue colored speckles of citric acid and/or green colored speckles of citric acid.
5. A cleaning tablet according to Claim 1 further containing 1 wt. % to 20 wt. % of a bleach compound.
6. A cleaning tablet which comprises by weight:
  - 20 (a) 25% to 50% of an alpha hydroxy aliphatic acid;
  - (b) 25% to 43% of an alkali metal bicarbonate;
  - (c) 1% to 15% of an alkali metal carbonate;
  - (d) 1% to 9% of a clay;
  - (e) 1% to 10% of a sulfonated anionic surfactant;
  - 25 (f) 2% to 12% of a C<sub>4</sub>-C<sub>12</sub> aliphatic dicarboxylic acid;
  - (g) 1% to 20% of a bleach containing compound; and
  - (h) 0.1% to 6% of an amorphous precipitated silica.
7. A cleaning tablet according to Claim 6, wherein said clay is a laponite clay.



WO 03/089560

PCT/US03/11211

16

8. A cleaning tablet according to Claim 6 further including a perfume.
9. A cleaning tablet further including 1 wt. % to 20 wt. % of a bleach compound.

5